DOCUMENT RESUME

ED 122 832 IR 003 450

AUTHOR Mock, Karen R.
TITLE Children's Attention to Television: The Effects of Audio-Visual Attention Factors on Children's Television Viewing Strategies.
PUB DATE Apr 76
NOTE 12p.; Paper presented at the American Educational Research Association Annual Meeting (San Francisco, California, April 19-23, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Audiovisual Aids; Cues; Educational Television; Elementary Education; Eye Movements; Males; *Media Research; Primary Education; *Production Techniques; *Public Television; *Reading Ability; *Reading Skills; Television Research
IDENTIFIERS Electric Company

ABSTRACT

In order to examine the relationship of audiovisual factors and reading ability to children's television viewing strategies, the eye movements of 30 boys, aged 8 to 10 years, were recorded while they watched a televised display in which audiovisual factors varied systematically. Selected segments of "The Electric Company" were used to investigate production variables: video condition, audio conditions, instructions or an invitation to read, cues as to the location of print, movement vs. static print, repetition of format, repetition of content, and duration of exposure. Results of analysis of the eye movement recordings indicated a relationship between television viewing strategies and reading ability. Good readers oriented to the print on the screen significantly faster than average or poor readers and spent a significantly greater percentage of fixation time on the print. Poor readers made significantly more random and off-screen fixations. In addition, good readers made more left-to-right eye movements on print. Among the recommendations resulting from this study were: (1) the audio track should follow the onset of print with a delay long enough to orient to the print; and (2) cues should indicate the location of print. (Author/LS)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED122832

CHILDREN'S ATTENTION TO TELEVISION:
The effects of audio-visual attention factors on children's television viewing strategies

Karen R. Mock
University of Toronto
Faculty of Education

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Prepared for the American Educational Research Association, Annual Meeting, San Francisco, April 1976.

Session 2102

IR 003 450

A disappointing aspect of research on instructional television over the past several years is the relatively small number of studies that have dealt with production variables or variation in methods of organizing and presenting program content. Researchers are turning increasingly, however, to the relationship between individual differences and learning via the media.

From the literature, one thing seems clear: a prerequisite for learning from televised instruction is that the program elicit and sustain the student viewer's attention and interest (Palmer, 1969, 1972; Fowles, 1973; Ogston, 1975). In an educational television program, however, generalized attention is often insufficient. Attention must be directed narrowly and precisely to the critical aspects of the subject matter. For example, in a program designed to teach reading, learning is contingent upon the viewer's selecting and attending to the print on the screen.

The concept of attention, although variously defined, is relevant to the study of educational television for several reasons. Children with learning problems (in particular, children with reading problems) have been found to exhibit difficulties in attending behaviour in the classroom (Noland and Schuldt, 1971; Magdol, 1972; Wender, 1973); gaining and maintaining attention are necessary prerequisites for learning to occur (Neisser, 1967; Gagné, 1970); and the attention processes of arousal and selectivity are influenced both by the properties of the stimulus and the requirements of the task at hand (Broadbent, 1958; Berlyne, 1960; Triesman, 1969; Kahneman, 1973). An understanding of how production variables can be manipulated to influence attention, and how these relate to individual viewer characteristics, can make the difference between the success and failure of an educational television program in meeting its instructional goal for a specified target population. That is,

research on visual selective attention can ultimately be expected to contribute to the design of televised material.

As has been already well documented in the literature, eye movement recording is especially appropriate for studying children's attention to television. Eye movements are largely involuntary (Yarbus, 1967) and have been found to reflect differences in both reading ability (Tinker, 1946, 1958) and in cognitive development and perceptual processing in general (Mackworth and Bruner, 1970; O'Bryan and Boersma, 1971; Carpenter and Just, 1972). Eye movement recording is a viable technique for exploring the moment-to-moment information intake as a child watches a televised display (Guba et al, 1964; Wolf, 1971; O'Bryan, 1972, 1974). The eye movement research I have conducted along these lines involved the study of children's attention to a television show designed to teach reading. The investigation addressed three main questions:

1. What are the characteristic viewing patterns of children varying in reading ability?
2. Can the manipulation of production variables influence these attention patterns?
3. Under what conditions will visual attention be attracted or directed to the print on the screen?

In order to examine the relationship of audio-visual factors and reading ability to children's television viewing strategies, the eye movements of 30 boys, aged 8 to 10 years, were recorded while they watched televised display in which audio-visual factors varied systematically. The reading ability of each child had been assessed prior to the eye movement recording. The corneal reflection technique was used. The stimulus material consisted

of selected segments of "The Electric Company," a production of the Children's Television Workshop. The production variables chosen for investigation included: video condition (animation, live actors, computer bridging, or print only), audio conditions (voice-over simultaneous to print on-set , following print on-set, or no voice-over), instructions or an invitation to read, cues as to the location of print, movement vs static print, repetition of format (i.e., repetition with variation), repetition of content (exact repetition), and duration of exposure.

Results of analysis of the eye movement recordings corroborated and elaborated the findings in the literature that there is relationship between television viewing strategies and reading ability. Good readers orient to the print on the screen significantly faster than average or poor readers and spend a significantly greater percentage of fixation time on the print. Poor readers, on the other hand, make significantly more random and off-screen fixations. In addition, good readers make more left-to-right eye movements on print. There are two possible interpretations for the differences in viewing patterns between good and poor readers. First, it has been reported in the literature that viewers will scan the areas of a display which are most informative (Yarbus, 1967; Mackworth and Bruner, 1970). Good readers, familiar with the reading process, immediately orient to the print as a source of additional information; whereas poor readers attempt to obtain the information through other means (i.e., the sound track , pictures, etc.). However, the reading group differences in viewing strategies are also consistent with an avoidance interpretation (Luborsky, Blinder, and Mackworth, 1963) that is, children who have already begun to experience failure and frustration with reading may actually be avoiding the print as a threatening stimulus. The eye

movement data not only reflect an individual's information processing strategy, but also may reflect perceptual strategies guided by affect, such that anxiety-provoking stimuli may be avoided. Further research, particularly relating other physiological and learning measures to the eye movement patterns will likely tease out the processes involved.

Analysis of several combinations of segments of the tape revealed that, while the effects of reading ability remained somewhat consistent, viewing strategies of both good and poor readers can be altered by the manipulation of production variables, or what I have called audio-visual attention factors. In general, attention to print was increased when there was a delay or absence of voice-over, when there was little or no competing video component, when the print itself moved, or with the use of cues, instructions, or format repetition. Exact repetition and very long duration of a segment tended to decrease attention to the print. Interactions with reading ability occurred with attention to the video component (poor readers spent more time fixating animated pictures), with variations in the sound track (the no-sound condition had the greatest effect on average readers), and with duration (the proportion of print fixation time did not decrease for poor readers as it did for good and average readers with very long segments).

I have prepared a brief demonstration film of the eye movement patterns of several subjects to illustrate the nature of the eye movement recordings and samples of various viewing patterns.

- demonstration film -

The eye movement data demonstrated that providing the viewer with cues as to where to look for relevant information facilitates the visual search of a televised display. That is, a set can be induced in the viewer through the

use of instructions, cues, format repetition or anticipation when the sound track is not simultaneous to the print. It is likely that this set or expectancy directs the viewer's attention and influences his scanning patterns in a search for information. In addition, it appears that involuntary selective attention can be attracted by inherent properties of the critical stimulus itself (e.g., movement).

Anecdotal evidence in the verbal reports of the children after viewing the tape in many cases reflected the findings of the eye movement recordings. I shall go into detail on the sound track manipulations. For example, a few good readers said they did not notice that the sound had been suppressed in some segments, while others said they had noticed it and even liked it because it allowed them to read themselves. On the other hand, several children in the poor reading group openly admitted that they did not like it at all when the sound was off, because they didn't like to read the words. However, both the eye movement data and verbal reports lent support to the hypothesis that increased attention to print when there was no voice-over would be most evident in the average reading group. It appears that good readers attend to the print regardless, while average readers take the "lazy" way out, pick up the printed information via the sound track, and utilize their reading skills when the voice-over is absent. Poor readers orient to the print significantly faster when there is no voice-over, but because of their lack of reading skills, the scanning becomes random once again. The subsequent viewing patterns appear somewhat disorganized, and the verbal reports reflect frustration when the sound is off. Delayed voice-over, however, appears to have the effect of redirecting visual attention to the print.

The effects of the sound track manipulations may be interpreted in the light of cue summation theory (cf. Severin, 1968). For good and average readers, the identical information in the aural and visual channels is redundant; so the viewer can attend to either one without a loss in learning. The good reader chooses the print because he enjoys reading and, in any case, orients more quickly to various sources of information. The average reader, whose skills are not as polished, selects the aural channel. Since the channels are redundant in the simultaneous condition, the viewer can choose the one for which he has to exert the least effort (cf. Kahneman, 1973) and still gain the same information. However, for the poor reader who has very few word attack skills, the visual cues contain little information on their own. The voice-over becomes an "additional and nonredundant cue" which, according to cue summation theory, will enhance learning. It appears, then, that the delayed voice-over technique may be the most appropriate use of sound for teaching reading via television. The "lazy" reader who has some reading ability would likely not wait for the voice to give him the information; and so, the delayed technique would encourage him to read for himself with sound track becoming a source of verification. The poor reader, on the other hand, would use the additional cues of the voice-over for help in decoding the print, and would not be frustrated by having missed the information altogether. An important area for further research is the determination of the optimal interval between the onset of print and the onset of the voice-over. Eye movement recording would be paticularly suitable for such an investigation since the delay must be long enough for the poor readers to orient to the print, but short enough so the voice is introduced while the viewer is still attending to the print and before random scanning occurs as a result of frustration.

While time does not permit the detailed discussion of several areas of further research suggested by this investigation, several specific recommendations for the teaching of reading via television may be advanced as follows:

a) The audio track should follow the onset of print with a delay long enough to the viewer to orient and fixate the print before the voice-over reads it for him. For the poor reader the interval should not be so long as to lead to random viewing due to frustration.

b) Cues (visual and/or auditory) should be provided as to the location of print, preferably prior to the onset of print, to allow for anticipatory orientation. This can be accomplished, for example, by repetition of format, pointing, or word balloons, particularly in live studio produced segments.

c) Exact repetition of print and overly long segments should be avoided unless devices to redirect attention to print are employed (e.g., delayed voice-over).

d) Movement on a primarily static display attracts visual attention. Print animation is an extremely effective print attention device.

e) Writers should attempt to induce expectancy that some key information is contained in the print or that something is about to happen to the print. For example, non-threatening instructions, the posing of problems or questions (especially when accompanied by delayed voice-over) invites viewers to seek the printed information.

f) If the picture component is to be used in aiding the reading process by providing additional information, animation should be used.

g) Print in centre screen should be preceded by a momentarily blank screen, although (because of low appeal) the print-only technique should not be overdone and should be fast paced.

h) If left → right scanning is a specified curriculum goal, stimuli should include longer words and also sentences.

i) Further research should be conducted on experimentally produced segments implementing the above recommendations in order to evaluate the effect of attention factors on learning to read via television.

In conclusion, it is clear that attention research bears importantly on instruction via the media. The study reported here, while essentially formative in nature, has demonstrated the usefulness of eye movement recording in providing program designers with information regarding children's viewing strategies and the effect of production variables on these attention patterns.

REFERENCES

Berlyne, D.E. Conflicts, arousal, and curiosity. New York: McGraw-Hill, 1960.

Broadbent, D.E. Perception and communication. New York: Pergamon Press, 1958.

Carpenter, P.A., and Just, M.A. Semantic control of eye movements in picture scanning during sentence-picture verification. Perception and psychophysics, 1972,12, 61-64.

Fowles, B. Verbal report as an index of effectiveness of television instruction. Unpublished doctoral dissertation, Yeshiva University, 1973.

Gagne, R.M. Learning theory, educational media, and individualized instruction. Educational Broadcasting Review, 1970, 4, 49-62.

Guba, E., Wolf, W., deGroot, S., Knemeyer,M., VanAtta,R., Light,L. Eye movements and TV viewing in children. Audio-visual Communications Review, 1964, 12, 386-401.

Kahneman, D. Attention and effort. Prentice-Hall Inc., Englewood Cliffs, New Jersey: 1973.

Luborsky,L., Blinder, B., and Mackworth,N. Eye fixation and recall of pictures as a function of GSR responsitivity. Perceptual and Motor Skills, 1963, 16, 469-483.

Mackworth, N.H. and Bruner, J.S. How adults search and recognize pictures. Human Development, 1970, 13(3), 49-77.

Magdol, M.S. Problems in attention: clearing up the terminology. Academic Therapy, 1972, 8, 141-153.

Neisser, U. Cognitive Psychology, New York: Appleton-Century-Crofts, 1967.

Noland, E.C., and Schuldt, W.J. Sustained attention and reading retardation. Journal of Experimental Education, 1971, 40, 73-75.

O'Bryan, K.G. Report on children's television viewing strategies. Unpublished manuscript. Ontario Institute for Studies in Education, 1972.

O'Bryan, K.G. Summary of research findings from eye movement studies of children's reading strategies. Unpublished manuscript. Ontario Institute for Studies in Education, Ontario Educational Communications Authority, 1974.

O'Bryan, K.G. and Boersma, F.J. Eye movements, perceptual activity, and conservation development. Journal of Experimental Child Psychology, 1971, 12, 157-169.

Ogston, D.G. The relationship between a behavioral measure of television viewing and learning from instructional television. Paper presented at the Canadian Psychological Association Meeting, Quebec, June 1975.

Palmer, E. Research at the Children's Television Workshop. Educational Broadcasting Review, 1969, 3, 43-48.

Palmer, E.L. Formative research in the production of television for children. Paper submitted to the Annenberg International Symposium on Communication, March, 1972.

Severin, W.J. Cue summation in multiple channel communication. Madison: University of Wisconsin, 1968.

Tinker, M.A. The study of eye movements in reading. Psychological Bulletin, 1946, 43, 93-120.

Tinker, M.A. Recent studies of eye movements in reading. Psychological Bulletin, 1958, 55, 215-231.

Triesman, A. Strategis and models of selective attention. Psychological Review, 1969, 76, 282-289.

Wender, P.H. Minimal brain dysfunction in children: diagnosis and management. Pediatric Clinics of North America, 1973, 20, 187-202.

Wolf, W. Perception of visual displays. Viewpoints, Bulletin of the School of Education, Indiana University, 1971, 47, 112-140.

Yarbus, A.L. Eye movements and vision. New York:Plenum, 1967.